WSR-88D and Wind Farm FAQs
Updated 6/28/07

Q1. Why doesn't the WSR-88D clutter suppression remove the signatures of wind towers/turbines?
Q2. How can WSR-88D systems "see" wind towers/turbines when I can't visually see the WSR-88D from the wind farm?
Q3. How much energy does the WSR-88D transmit?
Q4. What is "Radar-Line-of Sight" and why is that important?

Q1. Why doesn't the WSR-88D clutter suppression remove the signatures of wind tower/turbines?

REPLY: In order to reduce the strong, singular targets "seen" by the radar, the WSR-88D has a clutter filter algorithm that removes clutter/ground targets/non-meteorological targets. A basic premise of the clutter filter is that a clutter target has no motion (zero instantaneous velocity). However, when a WSR-88D "sees" a wind farm, the turbines are usually in motion and therefore have a nonzero velocity. Hence, the NEXRAD clutter filter algorithm does not remove the returns of the wind farms in most situations.

Q2. How can WSR-88D systems "see" wind towers/turbines when I can't visually see the WSR-88D from the wind farm?

REPLY: The path the energy a radar emits (i.e., the radar-line-of sight) takes depends upon atmospheric density. Density differences are caused by variations in pressure, temperature and moisture. In a "standard atmosphere" representative of the atmosphere on a day with enough wind to mix the lower atmosphere well, the radar beam takes a path that is approximately 4/3 of the Earth's radius. This bending is called "refraction." So, the WSR-88D, like other radars, can "see" targets well beyond the optical line of sight. Figure 1 is a depiction of the beam's path in a standard atmosphere.

Figure 1.

Q3. How much energy does the WSR-88D transmit?

REPLY: 750 Kilowatts.

Q4. What is “Radar-Line-of Sight” and why is that important?

REPLY: The radar-line-of sight/radar beam width can be considered analogous to the beam of light coming from a flash light. Most of the energy of the flashlight, just as with the radar, is in the beam of light/radar beam. In radar’s this is the distance between the “half power” points or where the energy in the beam is down 3 dB from that at the center of the beam. For the WSR-88D the beam width is approximately 1 degree. As the beam propagates from the radar, the beam width increases. For WSR-88Ds, at 60 nm from the radar the beam is approximately 1 nm wide. Obstacles in the radar-line-of sight can block the radar signal and reduce the ability of the radar to see targets further downrange. Figure 2 is a depiction of the radar-line-of sight.

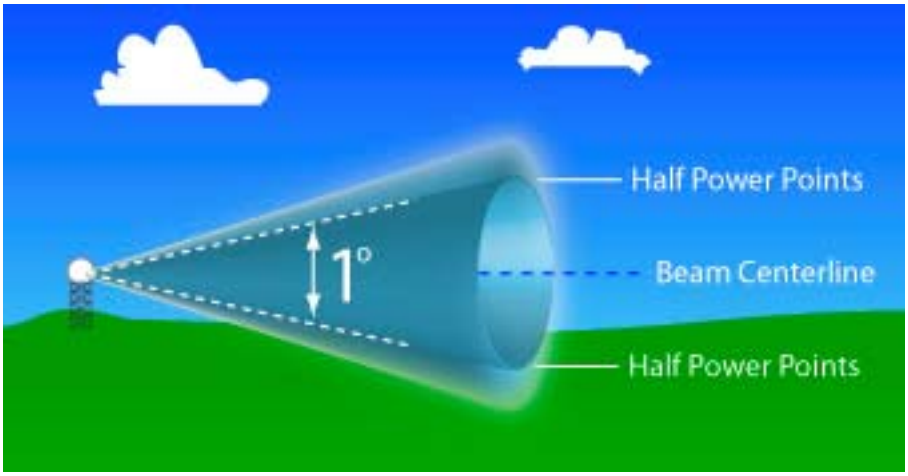

Figure 2.